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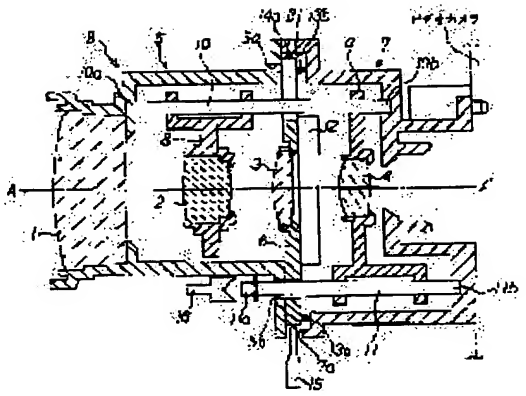
)PTICAL LENS BARREL AND OPTICAL EQUIPMENT USING THE SAME

bstract:

3LEM TO BE SOLVED: To provide an optical lens barrel constituted at an image is prevented from being deteriorated caused by variance group of respective lenses and between the groups without nding on the high processing accuracy of the individual lenses and the assembling accuracy of the respective lenses with respect to the lens l.

JTION: A holding member 6 supported by the lens barrel B so as to be moved in parallel with a direction orthogonally crossed to the tion of an optical axis A-A' and fixed to the lens barrel B at a desired ion is provided with one fixed optical system group 3 out of the plural optical system groups 1 and 3. Besides, a holding member 9 ectively coupled to a first guide member 10 and a second guide ber 11 so as to be freely moved in the direction of the optical axis A- provided with one moving optical system group 4 out of the plural ng optical system groups 2 and 11. Then, both ends of the first guide ber 10 are supported and fixed to the lens barrel B. Besides, the nd guide member 11 is fixed to the lens barrel B at the desired ion in a state where one end thereof is cantilever-supported and the end 11a thereof is supported so as to be freely displaced in the eter direction of itself.



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ɲ(s)]
ɲ 1] It is the optical-system lens-barrel characterized by preparing the fixed optical-system group of one group in
:achment component which is supported free [a parallel displacement] in the direction which intersects
ndicularly with the direction of an optical axis at said lens-barrel, and fixes to said lens-barrel in a desired location
g the fixed optical-system groups of said two or more groups in the optical-system lens-barrel which holds the
optical-system group of two or more groups by the lens-barrel in the direction of an optical axis, and changes.
n 2] In the optical-system lens-barrel which holds the migration optical system of two or more groups by the lens-
in the direction of an optical axis, and changes one migration optical-system group among the migration optical-
n groups of said two or more groups The 1st guide member by which support immobilization of the both ends was
d out at said lens-barrel, And the optical-system lens-barrel characterized by being prepared in the attachment
onent connected with each of the 2nd guide member which the other end is supported in the shape of a cantilever,
ıe free end is supported by said lens-barrel free [displacement in the direction of a path of itself], and fixes in a
:d location free [migration in the direction of an optical axis].
ɲ 3] In the optical-system lens-barrel which holds the fixed optical-system group of two or more groups, and a
ıtion optical-system group by the lens-barrel in the direction of an optical axis, and changes the fixed optical-
m group of one group among the fixed optical-system groups of said two or more groups It is prepared in the
ıment component which is supported by said lens-barrel free [a parallel displacement] in the direction of an
al axis, and the direction which intersects perpendicularly, and fixes to said lens-barrel in a desired location. One
ıtion optical-system group among the migration optical-system groups of said two or more groups The 1st guide
ber by which support immobilization of the both ends was carried out at said lens-barrel, And the optical-system
barrel characterized by being prepared in the attachment component connected with each of the 2nd guide member
h the other end is supported in the shape of a cantilever, and the free end is supported by said lens-barrel free
)lacement in the direction of a path of itself], and fixes in a desired location free [migration in the direction of an
al axis].
m 4] It is the optical-system lens-barrel characterized by having been supported free [displacement in the direction
)ath] by the hole where, as for said 2nd guide member, the free end was established in said lens-barrel in claim 2 or
d having projected to the exterior of said lens-barrel.
ım 5] In the optical-system lens-barrel which holds the migration optical system of two or more groups by the lens-
:l in the direction of an optical axis, and changes one migration optical-system group among the migration optical-
:m groups of said two or more groups The 1st guide member by which support immobilization of the both ends was
ed out at said lens-barrel, and the optical-system lens-barrel to which both ends are characterized by being prepared
e attachment component connected with each of the 2nd guide member which is supported free [displacement in
lirection of a path of itself], and fixes in a desired location free [migration in the direction of an optical axis] at
lens-barrel.
im 6] In the optical-system lens-barrel which holds the fixed optical-system group of two or more groups, and a
:ation optical-system group by the lens-barrel in the direction of an optical axis, and changes the fixed optical-
:m group of one group among the fixed optical-system groups of said two or more groups It is prepared in the
:hment component which is supported by said lens-barrel free [a parallel displacement] in the direction of an
:al axis, and the direction which intersects perpendicularly, and fixes to said lens-barrel in a desired location. One
ration optical-system group among the migration optical-system groups of said two or more groups The 1st guide
ıber by which support immobilization of the both ends was carried out at said lens-barrel, And the optical-system
-barrel characterized by being prepared in the attachment component connected with each of the 2nd guide member
:h both ends are supported by said lens-barrel free [displacement in the direction of a path of itself], and fixes to

s-barrel in a desired location free [migration in the direction of an optical axis].
7] Said 2nd guide member is an optical-system lens-barrel characterized by being supported free
cement] in the direction of a path in the hole where the other end was prepared in said lens-barrel in claim 5 or
ıg been supported free [displacement in the direction of a path] by the hole established in said lens-barrel in the
ı where the end differs from said hole, and having projected to the exterior of said lens-barrel.
8] It is the optical-system lens-barrel characterized by supporting free [a parallel displacement] in the direction
he direction of an optical axis and said lens-barrel cross at right angles the periphery edge of the attachment
ıent for the fixed optical-system groups of said one group in a crevice in claims 1 and 3 or 6.
9] It is the optical-system lens-barrel characterized for pinching free [a parallel displacement] in the direction
he direction of an optical axis and said lens-barrel cross at right angles the attachment component for the fixed
-system groups of said one group by the anterior part lens-barrel and the posterior part lens-barrel in claims 1 and
ɔy things.
10] It is the optical-system lens-barrel characterized by the fixed optical-system group of said one group being
:al lens in claims 1 and 3 or 6.
11] It is the optical-system lens-barrel which the fixed optical-system group of said two or more groups and the
ion optical-system group constitute an element of zoom optical system in claims 2, 3, and 5 or 6, and is
terized by the migration optical system of the former Norikazu group being a lens which has a competition
:r and a focusing function.
ı 12] The optical instrument characterized by using the optical-system lens-barrel of claim 1 thru/or any 1 term of

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LED DESCRIPTION

ed Description of the Invention]

of the Invention] This invention relates to the optical instrument using the optical-system lens-barrel and it which le finely the location of the lens which has a competition sweater and a focusing function as the afocal lens or ion optical-system group as a fixed optical-system group to a lens-barrel in more detail about the optical-system rrel of which the fixed optical-system group of two or more groups and migration optical-system group which ute an element of zoom optical system are held by the lens-barrel, and consist in the direction of an optical axis.

iption of the Prior Art] If it is in the optical-system lens-barrel used for image pick-up equipments, such as a le video camera, from before, the request of a miniaturization of a lens is especially strong and the miniaturization ns has progressed. In recent years, the image size of CCD is also miniaturized further and that by which the lens so microminiaturized is appearing. However, the sensitivity of lens each is also high with the niniaturization of a lens, and degradation of the image by the inside of the group of a lens and variation between became a new problem by the miniaturization of the image size of CCD, and it has risen to surface.
] Then, if it is in the above-mentioned optical-system lens-barrel in order to solve a ****** problem, the guarantee oduct has been obtained by raising the process tolerance of lens each, and the assembly precision of each lens to a arrel, and corresponding, in addition performing the image quality check of an image in an assembly final process.

]
lem(s) to be Solved by the Invention] However, in the above-mentioned optical-system lens-barrel, each lens to ocess tolerance and the lens-barrel of lens each degree[of assembly energy]-raised, since it corresponded, only in ocess tolerance and assembly precision of lens each, there was a limitation naturally and there was a problem that vement in the qualitative dependability of a product could not be aimed at, only by the parts control of such a onent part. especially the thing for which degradation of an image is prevented only in the components precision of nponent part when a lens is miniaturized further -- very much -- hard -- moreover, when the inside of the group of ns built into a lens-barrel and variation between groups were also taken into consideration, there was a difficulty of hard to be realized as a product.
] It succeeds in this invention that the difficulty like the above accompanying the miniaturization of a lens should lved. When the effect on image quality performs inclination adjustment and parallel eccentric adjustment to the tion of an optical axis especially about the lens used as the large candidate for adjustment in the case of the image ty check of the image in an assembly final process It aims at offer of the optical instrument using the optical-m lens-barrel and it which can prevent degradation of the image by the inside of the group of each lens and tion between groups, without being dependent on the advanced process tolerance of lens each, or an advanced nbly precision of each lens to a lens-barrel.
]
ns for Solving the Problem] If it is in the optical-system lens-barrel of this invention in order to attain the above-ioned purpose In the optical-system lens-barrel which holds the fixed optical-system group of [1]:two or more ps by the lens-barrel in the direction of an optical axis, and changes in the first place the fixed optical-system group e group among the fixed optical-system groups of said two or more groups It is characterized by being prepared in ttachment component which is supported by said lens-barrel free [a parallel displacement] in the direction of an al axis, and the direction which intersects perpendicularly, and fixes to said lens-barrel in a desired location, and is ****.

Moreover, if it is in the optical-system lens-barrel of this invention, the migration optical system of [2]:two or roups is set the second to the optical-system lens-barrel which holds by the lens-barrel in the direction of an axis, and changes in it. One migration optical-system group among the migration optical-system groups of said more groups The 1st guide member by which support immobilization of the both ends was carried out at said irrel, And it is characterized by being prepared in the attachment component connected with each of the 2nd guide er which the other end is supported in the shape of a cantilever, and the free end is supported by said lens-barrel lisplacement in the direction of a path of itself], and fixes in a desired location free [migration in the direction of cal axis].

Moreover, if it is in the optical-system lens-barrel of this invention, it sets to the optical-system lens-barrel which he fixed optical-system group of [3]:two or more groups, and a migration optical-system group by the lens-barrel direction of an optical axis, and turns to the third. The fixed optical-system group of one group among the fixed l-system groups of said two or more groups It is prepared in the attachment component which is supported by said arrel free [a parallel displacement] in the direction of an optical axis, and the direction which intersects idicularly, and fixes to said lens-barrel in a desired location. One migration optical-system group among the ion optical-system groups of said two or more groups The 1st guide member by which support immobilization of th ends was carried out at said lens-barrel, And it is characterized by being prepared in the attachment component cted with each of the 2nd guide member which the other end is supported in the shape of a cantilever, and the free supported by said lens-barrel free [displacement in the direction of a path of itself], and fixes in a desired on free [migration in the direction of an optical axis].

] especially -- the above [2] or [3] -- setting -- [4]: -- it is characterized by for said 2nd guide member having been rted free [displacement in the direction of a path] by the hole where the free end was established in said lens- , and having projected it to the exterior of said lens-barrel.

] Moreover, if it is in the optical-system lens-barrel of this invention, the migration optical system of [5]:two or groups is set the fourth to the optical-system lens-barrel which holds by the lens-barrel in the direction of an l axis, and changes in it. One migration optical-system group among the migration optical-system groups of said r more groups It is characterized by being prepared in the 1st guide member by which support immobilization of th ends was carried out at said lens-barrel, and the attachment component by which both ends were connected said lens-barrel free [migration in the direction of an optical axis] at each of the 2nd guide member which is rted free [displacement in the direction of a path of itself], and fixes in a desired location.

] Moreover, if it is in the optical-system lens-barrel of this invention, it sets to the optical-system lens-barrel which the fixed optical-system group of [6]:two or more groups, and a migration optical-system group by the lens-barrel direction of an optical axis, and turns to the fifth. The fixed optical-system group of one group among the fixed al-system groups of said two or more groups It is prepared in the attachment component which is supported by said barrel free [a parallel displacement] in the direction of an optical axis, and the direction which intersects ndicularly, and fixes to said lens-barrel in a desired location. One migration optical-system group among the ation optical-system groups of said two or more groups It is characterized by being prepared in the 1st guide ber by which support immobilization of the both ends was carried out at said lens-barrel, and the attachment onent by which both ends were connected with said lens-barrel free [migration in the direction of an optical axis] ch of the 2nd guide member which is supported free [displacement in the direction of a path of itself], and fixes to lens-barrel in a desired location.

2] especially -- the above [5], or [6] -- setting -- [7]: -- said 2nd guide member is characterized by to support the end free [displacement] in the direction of a path in the hole established in said lens-barrel, to have been orted free [displacement in the direction of a path] by the hole established in said lens-barrel in the location where nd differs from said hole, and to have projected to the exterior of said lens-barrel.

3] the above [1], [3], or [6] -- setting -- [8]: -- said lens-barrel [moreover,] Supporting the periphery edge of the hment component for the fixed optical-system groups of said one group free [a parallel displacement] in a crevice e direction of an optical axis, and the direction which intersects perpendicularly, [8-2] : said lens-barrel It is acterized by pinching the attachment component for the fixed optical-system groups of said one group free [a llel displacement] in the direction which intersects perpendicularly with the direction of an optical axis by the rior part lens-barrel and the posterior part lens-barrel etc.

4] the above [1], [3], or [6] -- setting -- [9]: -- the fixed optical-system group of said one group is characterized by g an afocal lens. [moreover,]

5] the above [2], [3], [5], or [6] -- setting -- [10]: -- the fixed optical-system group of said two or more groups, and a ation optical-system group -- an element of zoom optical system -- constituting -- **** -- said group -- migration

system is characterized by being the lens which has a competition sweater and a focusing function. [moreover,]
And if it is in the optical instrument of this invention, it is characterized by using [11]:above-mentioned [1]
any one optical-system lens-barrel of [10].
If it is in the optical-system lens-barrel of this invention which adopted the means like ****, it is considering as
ucture which makes free the parallel displacement of the fixed optical-system group (afocal lens) of one group
h an attachment component in the direction of an optical axis, and the direction which intersects perpendicularly.
oy, looking at the image formation image of a tested piece in the case of the image quality check of the image in
embly final process, by carrying out the parallel displacement of the fixed optical-system group of said one group
h an attachment component in the direction of an optical axis, and the direction which intersects perpendicularly,
el eccentric adjustment of the fixed optical-system group concerned is performed, and it becomes possible to fix
achment component to a lens-barrel in the location where the good image was obtained. The above-mentioned
optical-system group set as the object of ****** parallel eccentric adjustment contributes greatly [sensitivity is
lso in optical design and] to the miniaturization of the whole lens.
] Moreover, the migration optical-system group (lens which has a competition sweater and a focusing function) of
oup which moves in the direction of an optical axis on the basis of a guide member can perform now inclination
ment to the direction of an optical axis, or parallel eccentric adjustment by shaking the free end of the above-
oned guide member, or an end in the direction of a path. By this, looking at the image formation image of a tested
in the case of the image quality check of the image in an assembly final process The above-mentioned attachment
onent is minded for the migration optical-system group of said one group. The free end of a guide member, Or by
an end and shaking in the direction of a path, inclination adjustment of the migration optical-system group
rned or parallel eccentric adjustment is performed, and it becomes possible to fix the free end of the guide
er, or an end to a lens-barrel in the location where the good image was obtained. The migration optical-system
(lens which has a competition sweater and a focusing function) of the one above-mentioned group also has the
effect which it has to image quality in optical design, and is a lens group inclination adjustment or parallel
tric adjusting.
] By having carried out the deer and having adopted the means like ****, supply of the lens miniaturized further is
ed from the former, and manufacture of the optical instrument using the optical-system lens-barrel and it by which
y was stabilized also in image quality moreover is attained.
]
odiment of the Invention] Hereafter, this invention is explained in more detail based on the operation gestalt
n in an accompanying drawing. Drawing of longitudinal section in which drawing 1 shows the 1st operation gestalt
optical-system lens-barrel of this invention, drawing of longitudinal section in which drawing 2 shows the 2nd
tion gestalt of the optical-system lens-barrel of this invention, drawing of longitudinal section in which drawing 3
s the 3rd operation gestalt of the optical-system lens-barrel of this invention, and drawing 4 are drawings of
tudinal section showing the 4th operation gestalt of the optical-system lens-barrel of this invention among an
npanying drawing. In addition, in this operation gestalt, although the zoom lens for video cameras is illustrated as
tical-system lens-barrel, it is not limited to this.
1] The [1st operation gestalt] Drawing 1 is drawing of longitudinal section of the zoom lens for video cameras, and
ptical system of this zoom lens has 4 group composition which consists of the forward and forward fixed optical-
m groups 1 and 3 of two groups mentioned later, and the forward and forward migration optical-system groups 2
of two groups.
2] In drawing 1 the front ball lens as a fixed optical-system group and a sign 2 1 The BARIETA lens as a migration
al-system group, The rear relay focus lens as a migration optical-system group of others [sign / 3 / sign / 4 / the
l lens as a fixed optical-system group, and], The before side lens-barrel as an anterior part lens-barrel which is the
figuration member of the lens-barrel B which a sign 5 mentions later, A sign 6 The afocal frame as an attachment
ponent of an afocal lens 3, The posterior part lens-barrel as other configuration members of said lens-barrel B and 8
e BARIETA frame as an attachment component of the BARIETA lens 2, For 9, as for the guide bar as 1st guide
ber, and 11, the rear relay frame as an attachment component of the rear relay focus lens 4 and 10 are [the guide
s 2nd guide member and 12] the iris sections.
3] As shown in this drawing, by comparing junction edges in the direction of optical-axis A-A', and joining together
e screw whose junction edge concerned is not illustrated, said before side lens-barrel 5 and said posterior part lens-
el 7 are connected in one, and form Lens-barrel B. 5a is a hole for the adhesives impregnation for being prepared in
efore [Lens-barrel B] side lens-barrel 5, and carrying out adhesion immobilization of the afocal frame 6 at the
re side lens-barrel 5 concerned, and 7a is a hole for adjustment actuation which is established in the posterior part

ırrel 7 of Lens-barrel B, and justifies the afocal frame 6 with the below-mentioned external fixture 15. Two or
ıole 7a for this adjustment actuation is prepared in said posterior part lens-barrel 7 possible [many to /, such as
:ections or a three way, / justification of the afocal frame 6].
The periphery edge has entered the crevice B1 of Lens-barrel B in which said afocal frame 6 was formed of the
ın edge of the before side lens-barrel 5 and the posterior part lens-barrel 7. Said afocal frame 6 is supported free
allel displacement] in the direction which intersects perpendicularly with the direction of optical-axis A-A' by
more spring members 13a, 13b, and 14a by which the periphery edge has been arranged in a crevice B1. If it puts
ther way, said afocal frame 6 is supported by the before side lens-barrel 5 and the posterior part lens-barrel 7 free
allel displacement] in the direction which intersects perpendicularly with the direction of optical-axis A-A' by
more spring members 13a, 13b, and 14a.
| Said guide bar 10 is prolonged in the direction of optical-axis A-A', support immobilization of the other end 10b
ied out at the before side lens-barrel 5, and support immobilization of the other end 10a is carried out at the
ior part lens-barrel 7.
| On the other hand, it has extended in the direction of optical-axis A-A', and other end 11b is supported by the
ior part lens-barrel 7 in the shape of a cantilever, end 11a becomes the free end (adjustment edge), and said guide
is supported by the before side lens-barrel 5 free [displacement in the direction of a path of itself]. The free-end
:netrated hole 5b prepared in the before side lens-barrel 5, and has projected said guide bar 11 outside. Therefore,
.e bar 11 can tune now the rear relay focus lens 4 for inclination adjustment, parallel eccentric adjustment, etc.
to the direction of optical-axis A-A' by moving the free-end 11a from the exterior with the external fixture 16.
] Said BARIETA frame 8 is connected with the guide bar 10 free [migration in the direction of optical-axis A-
Said BARIETA frame 8 is driven with non-illustrated a motor (stepping motor) and a drive (for example, cam
moves in the direction of optical-axis A-A' on the basis of a guide bar 10, and performs variable power of a
graphic subject image.
] Said rear relay frame 9 is connected with guide bars 10 and 11 free [migration in the direction of optical-axis A-
Said rear relay frame 9 is driven with said non-illustrated motor (stepping motor) and drive (for example, cam
moves in the direction of optical-axis A-A' on the basis of guide bars 10 and 11, and performs focusing of a
graphic subject image.
'] Next, the adjustment approach of the afocal lens 3 in the optical-system lens-barrel of a **** 1 operation gestalt
ılained. Said especially afocal lens 3 has especially the large effect that the parallel eccentricity in a tele edge has
ıage quality, and it is difficult for it to acquire sufficient image quality according to a total error with error at the
of a components error and assembly. Therefore, inserting the external fixture 15 in hole 7a for adjustment
tion, and looking at the image formation image of a tested piece in the case of the image quality check of the image
assembly final process the direction which intersects the afocal frame 6 perpendicularly with the direction of
al-axis A-A' -- the bearing capacity (if it is in the spring members 13a and 13b -- the contact pressure of the afocal
: 6 to the anterior part lens-barrel 5 --) of the spring members 13a, 13b, and 14a If it is in spring member 14a, by
ng it resist and move to the holding power of the afocal frame 6 to the posterior part lens-barrel 7, parallel eccentric
tment of an afocal lens 3 is performed. This parallel eccentric adjustment is performed by the above-mentioned
nal fixture 15 from [, such as two directions or a three way,] many. And adhesives, such as UV curing agent, are
ed in from hole 5a in the location where good image quality was acquired, and the afocal frame 6 is fixed to the
e side lens-barrel 5. In this way, generating of gap etc. can be prevented even if, as for the afocal frame 6 by which
sion immobilization was carried out at the before side lens-barrel 5, external force acts from the outside at Lens-
l B, since the periphery edge is surrounded by the crevice B1 of Lens-barrel B.
0] Subsequently, the adjustment approach of the rear relay focus lens 4 in the optical-system lens-barrel of a **** 1
ation gestalt is explained. Said rear relay focus lens 4 is a lens group with the large effect to the direction of optical-
A-A' which inclines or it has on image quality by eccentricity etc. like the above-mentioned afocal lens 3.
efore, inclination adjustment of the rear relay focus lens 4 or parallel eccentric adjustment is performed by shaking
end 11a of a guide bar 11 in the direction of a path using the above-mentioned external fixture 17, connecting the
nal fixture 17 with free-end 11a of a guide bar 11, and looking at the image formation image of a tested piece in the
of the image quality check of the image in an assembly final process. And adhesives, such as UV curing agent, are
ed in from hole 5b in the location where good image quality was acquired, and free-end 11a of a guide bar 11 is
l to the before side lens-barrel 5.
1] In addition, in a **** 1 operation gestalt, although two or more spring members 13a, 13b, and 14a intervene
een the afocal frame 6 and the crevice B1 of Lens-barrel B The support means (for example, piece of a spring etc.)
:h have the same function as said each spring members 13a, 13b, and 14a are formed in the afocal frame 6, the

or part lens-barrel 7 which constitutes Lens-barrel B or the before side lens-barrel 5, and one. You may make it t the afocal frame 6 possible [a parallel displacement] in the direction of an optical axis in the crevice B1 of arrel B by the support means.

The [2nd operation gestalt] the optical-system lens-barrel of the 2nd operation gestalt shown in drawing 2 It ers as 4 group configurations from which optical system consists of the forward and forward fixed optical-system 1 and 3 of two groups, and the negative and forward migration optical-system groups 2 and 4 of two groups. nd (adjustment edge) 11a of a guide bar 11 was made to project further to the front side of the anterior part lens- 5 of Lens-barrel B, and also it is constituted like the optical-system lens-barrel of the above-mentioned 1st ion gestalt. If it is in the optical-system lens-barrel of a **** 2 operation gestalt, since it compared with the l-system lens-barrel of the 1st operation gestalt and free-end (adjustment edge) 11a of a guide bar 11 has projected to the front side of the anterior part lens-barrel 5, the deflection include angle to the direction of a path of free- a of a guide bar 11 becomes small, and very small inclination adjustment of the rear relay focus lens 4 or the l eccentric adjustment of it is attained.

] The [3rd operation gestalt] the optical-system lens-barrel of the 3rd operation gestalt shown in drawing 3 It lers as 4 group configurations from which optical system consists of the forward and forward fixed optical-system 1 and 3 of two groups, and the negative and forward migration optical-system groups 2 and 4 of two groups. nd (adjustment edge) 11a of a guide bar 11 is made to project further to the front side of the anterior part lens- 5 of Lens-barrel B. Hole 7b which carries out adhesion immobilization of the other end 11b concerned with ives while ****(ing) other end 11b of a guide bar 11 to the posterior part lens-barrel 7 of Lens-barrel B is ed. Furthermore, prepared fixed part 7c in the location of rear relay focus lens 4 approach at this posterior part arrel 7, and the other end 11b side of a guide bar 11 was supported in the shape of a cantilever by the fixed part 7c rned, and also it is constituted like the optical-system lens-barrel of the above-mentioned 1st operation gestalt. If it he optical-system lens-barrel of a **** 3 operation gestalt, since the guide bar 11 is supported in the shape of a ever in the location of rear relay focus lens 4 approach, inclination adjustment of the rear relay focus lens 4 can be med without making the rear relay focus lens 4 generate parallel eccentricity by shaking a guide bar 11 focusing above-mentioned fixed part 7a.

] The [4th operation gestalt] the optical-system lens-barrel of the 4th operation gestalt shown in drawing 4 It ders as 4 group configurations from which optical system consists of the forward and forward fixed optical-system s 1 and 3 of two groups, and the negative and forward migration optical-system groups 2 and 4 of two groups. a bar -- 11 -- an end -- 11 -- a -- ' -- a path -- a direction -- migration -- free -- a lens-barrel -- B -- before -- a side -- -barrel -- five -- having prepared -- a hole -- five -- b -- ' -- supporting -- the exterior -- projecting -- making -- hole ich prepared other end 11b' of said guide bar 11 in the posterior part lens-barrel 7 of Lens-barrel B -- ' -- the ion of a path -- migration -- free -- ****(ing) -- After inclination adjustment of the rear relay focus lens 4 or el eccentric adjustment Poured the above-mentioned adhesives into said hole 5b' and 7b', and carried out end 11a' uide bar 11 at the before side lens-barrel 5, and adhesion immobilization of other end 11b' was carried out at the rior part lens-barrel 7, respectively, and also it is constituted like the optical-system lens-barrel of the above- ioned 1st operation gestalt. If it is in the optical-system lens-barrel of a **** 4 operation gestalt, since the both of a guide bar 11 are supported by Lens-barrel B movable in the direction of a path, the range of inclination tment of the rear relay focus lens 4 or parallel eccentric adjustment can be taken greatly.

5] as mentioned above , the optical system lens-barrel of this operation gestalt can raise the power (sensitivity) of lens , when become the product by which quality be stabilized in image quality about the large afocal lens 3 of t and the rear relay focus lens 4 which be give to image quality , since fine tuning of parallel eccentric adjustment , ation adjustment , etc. be enable by image quality evaluation in the lens unit condition , and it can respond also to ns further miniaturized from before .

6] moreover -- since the afocal frame 6 is pinched by the anterior part lens-barrel 5 of Lens-barrel B, and the rior part lens-barrel 7 possible [a parallel displacement] in the direction of optical-axis A-A', and the direction h intersects perpendicularly -- falling -- etc. -- generating can be prevented and parallel eccentric adjustment of an al lens 3 is attained.

7] Moreover, since free-end 11a of a guide bar 11 or end 11a' has projected outside from hole 5b of Lens-barrel B, 5b', inclination adjustment of the rear relay focus lens 4 or parallel eccentric adjustment can be easily performed the outside of Lens-barrel B.

8]

ct of the Invention] As mentioned above, looking at the image formation image of a tested piece in the case of the e quality check of the image in an assembly final process according to this invention, as explained Since parallel

ic adjustment of the fixed optical-system group of one group can be performed and inclination adjustment of a on optical-system group or parallel eccentric adjustment of one group can be performed similarly Like before, ation of the image by the inside of the group of each lens and variation between groups can be prevented, without lependent on the advanced process tolerance of lens each, or an advanced assembly precision of each lens to a irrel.

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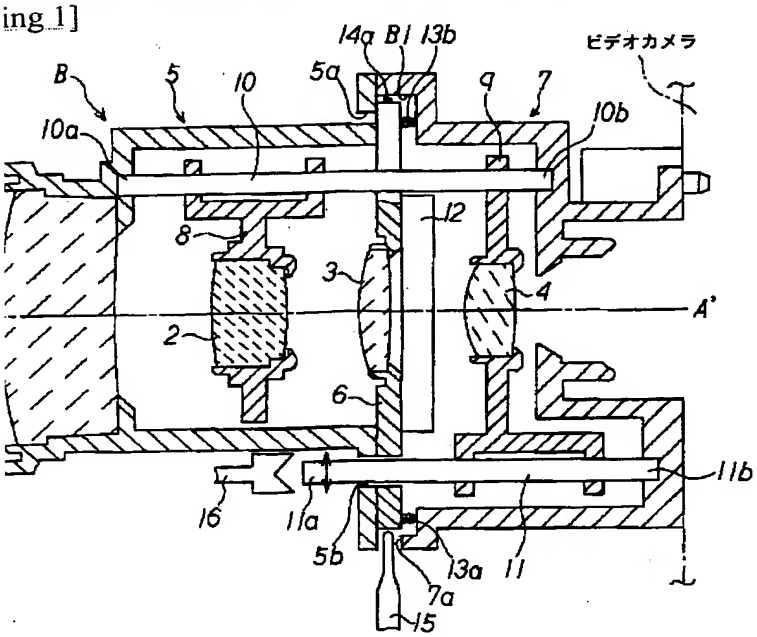
shows the word which can not be translated.
e drawings, any words are not translated.

VINGS

ing 1]



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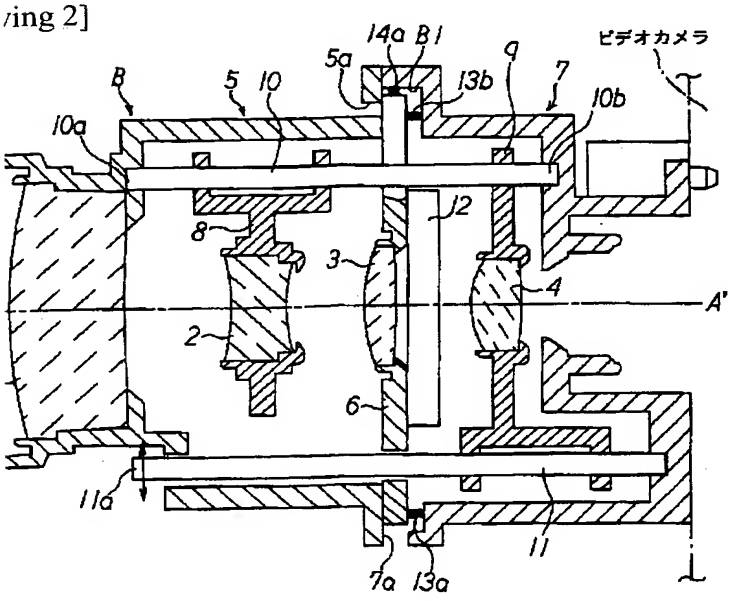

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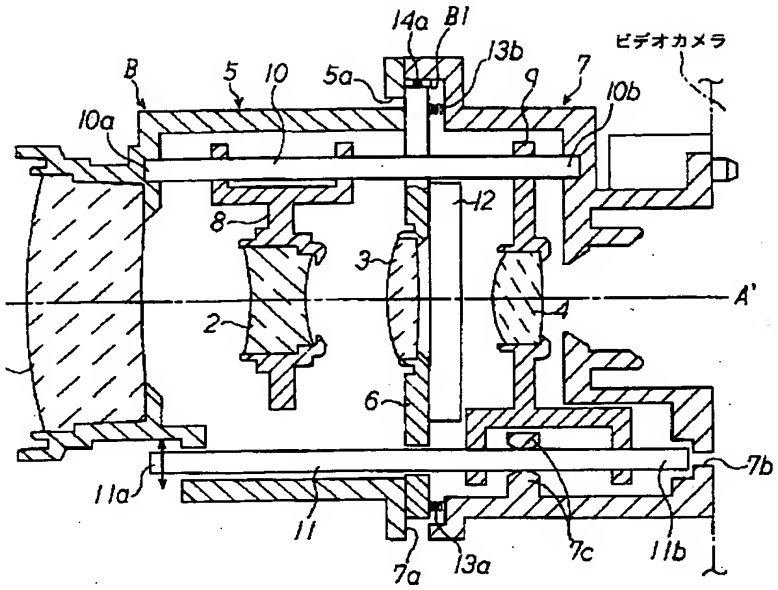
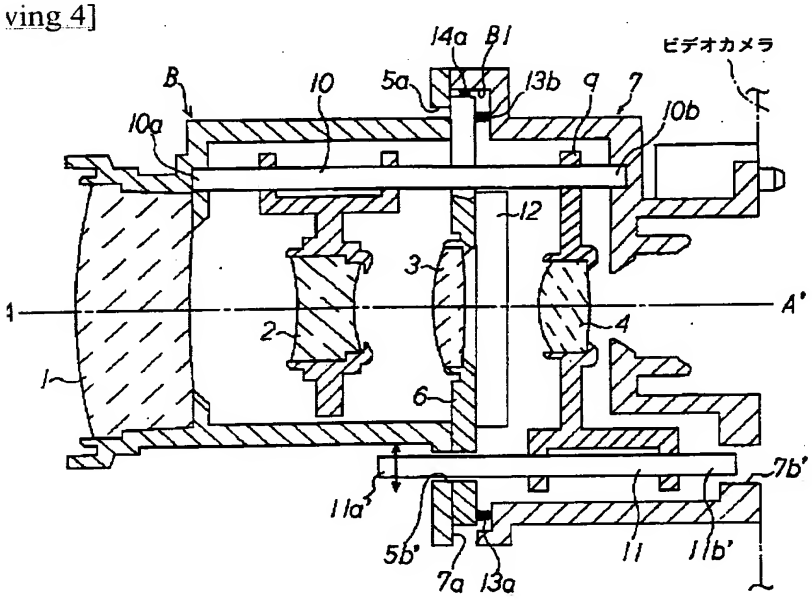


ving 4]



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